

UOT: 504.054

CLINICAL WASTE MANAGEMENT IN AZERBAIJAN

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The management of clinical waste has great importance due to its infectious and hazardous nature that can cause risks on environment and public health. The study was conducted to evaluate clinical waste management practices and to determine the amount of waste generated in five purposively selected healthcare facilities in Baku city.

Key words: Clinical waste, waste management, waste generation, health risks, environmental risks

Today, the rapid growth of the world population and the rising standard of living have resulted in an increase in the amount of solid waste. In order to solve the environmental problems in the world, proper management principles are being determined. These management principles are generally to prevent the formation of wastes, to reduce the amount of wastes to be disposed of by reuse and recovery and to ensure the safe disposal of residual wastes.

Medical waste from hospitals and other health care facilities is one of the dangerous wastes related to public health and must be given serious attention and properly defined as an individual waste stream. One of the most common problems of medical wastes is inadequate waste management, not being aware of harmful effects on health, insufficient financial and human resources. Improper handling of medical wastes, poorly planned and controlled incineration plants generate significant amounts of hazardous pollutants. Improper handling of medical wastes, poorly planned and controlled incineration plants generate significant amounts of hazardous pollutants. Control of clinical waste under the law should be reinforced.

1. General definition and classification of clinical waste

The term health-care waste includes all the waste generated within health-care facilities, research centres and laboratories related to medical procedures. Between 75% and 90% of the waste produced by health-care providers is comparable to domestic waste and usually called "non-hazardous" or "general health-care waste". It comes mostly from the administrative, kitchen and housekeeping functions at health-care facilities and may also include packaging waste and waste generated during maintenance of health-care buildings. The remaining 10–25% of health-care waste is regarded as "hazardous" and may pose a variety of environmental and health risks. [10, p.3]. Hazardous waste can be divided into categories according to the risks involved:

Sharps waste. Sharps are items that could cause

cuts or puncture wounds, including needles, hypodermic needles, scalpels and other blades, knives, infusion sets, saws, broken glass and pipettes.

Infectious waste. Infectious waste is material suspected to contain pathogens (bacteria, viruses, parasites or fungi) in sufficient concentration or quantity to cause disease in susceptible hosts

Pathological waste. Pathological waste consists of tissues, organs, body parts, human fetus, animal blood, blood and body fluids.

Chemical waste. Chemical wastes contain chemicals that are solid, liquid and gaseous. (e.g. after diagnosis and testing and after cleaning, domestic waste and disinfection)

Wastes containing high amounts of heavy metals. These metals constitute a subclass of hazardous chemical wastes and are usually highly toxic.

Pharmaceutical waste. Pharmaceutical waste includes expired, unused, spilt and contaminated pharmaceutical products, prescribed and proprietary drugs, vaccines and sera that are no longer required, and, due to their chemical or biological nature, need to be disposed of carefully.

Radioactive waste. Radioactive wastes are materials contaminated with radionuclides. They are produced as a result of procedures such as in vitro analysis of body tissue and fluid, in vivo organ imaging and tumour localization, and various investigative and therapeutic practices.

Generation of Medical Waste

The amount of medical waste depends on various factors such as waste management methods of organizations, types of establishments, characteristics of hospitals, reusability rates of used medical supplies, and daily patient volume. [7, p.34] Generation quantities of wastes vary in regions within the country. In low-income and middle-income countries, medical waste is generally lower than in high-income countries.

The average distribution of health facility wastes are shown below can be beneficial in the waste management start-up plan:

a) 80% of health facility wastes are non-

infectious wastes, which can be disposed of by domestic or urban waste management system

- b) 15% pathological and infected waste
- c) 1% needles, scalpels
- d) 4% pharmaceutical wastes
- e) Less than 1% of the wastes are cytotoxic, radioactive, pressure vessels, etc. [5, p.32]

Every year an estimated 16 billion injections are administered worldwide, but not all of the needles and syringes are properly disposed of afterwards.

High-income countries generate on average up to 0.5 kg of hazardous waste per bed per day; while low-income countries generate on average 0.2 kg. However, health-care waste is often not separated into hazardous or non-hazardous wastes in low-income countries making the real quantity of hazardous waste much higher. [9, p.34]

2. Main Stages of Clinical Waste Management Segregation

The main component of the prevention of pollution is primarily the segregation of waste. The accumulation of hazardous wastes in different categories from non-hazardous wastes helps reduce the amount and volume of wastes.

Recycling and reuse

The reuse of medical and other equipment used in health facilities is only possible when sterilization rules are strictly observed. The reusable equipment includes certain cutters (lancet, syringe needle, syringe), glass bottles and containers. Once these materials have been used, they must be carefully washed away (especially with syringe needles remaining drips that may cause disease), separated from the non-used instruments and then sterilized as appropriate according to the following processes.

Waste Disposal and Packaging

A convenient way of managing and minimizing medical wastes is the separation and identification of wastes. Waste generators should be responsible for the sorting that is possible in the place where the waste is generated, during transport and during storage. The same system must be mandatory for the entire country. [8, p.34]

Table 1. Color coding according to the type of waste

Color coding	Type of waste
Black	Household refuse (packaging, tissues, disposable cups, cans etc.)
Red	Anatomical waste (body parts, organs, blood bags, blood preserves)
Yellow	Wipes, gloves, dressings, bandages, aprons etc.
White	Dental (amalgam)

Source: [7, p.45] has been made by author.

Collection within the health-care facility

Collection times should be fixed and appropriate to the quantity of waste produced in each area of the

health-care facility. General waste should not be collected at the same time or in the same trolley as infectious or other hazardous wastes.

Interim storage in medical departments

In health institutions, medical wastes must be stored by authorized bodies on a regular basis to be taken to the final disposal unit. Health facilities with more than 20 bed capacities are obliged to make a temporary medical waste repository.

Transportation of Medical Wastes

Onsite transportation. Competent authorities are responsible for adequate classification and safe packaging of the waste so that the waste can be transported safely.

Offsite transportation. Medical wastes must be transported to the final disposal site by municipalities or by specially designed vehicles for this work by contracted organizations.

Treatment and disposal methods

Overview of waste treatment technologies:

1. Incineration

Incineration is a dry oxidation process that takes place at high temperatures and converts organic and other combustible wastes into inorganic, non-combustible materials.

2. Autoclaving (Steam Sterilization)

Autoclaving is a process of disinfection with an efficient wet heat treatment. Typically, autoclaves are used for the sterilization of reusable medical equipment in hospitals.

3. Microwave treatment technologies

Many microorganisms are destroyed by microwaves with a frequency of 2450 MHz and a wavelength of 12.24 cm. The water in the wastes is quickly heated by microwaves and the infectious components are destroyed by heat transfer.

4. Landfill

If municipalities or medical authorities do not have the necessary infrastructure to process medical waste before it is stored, then it is an acceptable method to dispose of medical waste on landfills.

5. Inertification Process

Inertification is a process that mixing waste with cement or other materials before the disposal of waste to minimize the risk of mixing toxic substances with surface or ground water.

3. Clinical Waste Management in Azerbaijan

The data, which gathered about clinical waste management in Baku, were based upon reviewing the statistical records of selected hospitals. For segregation and storage they use 3 different colored containers and a cardboard box. Each room was equipped with these containers and boxes.

- 1) Household wastes collecting in grey containers
- 2) Laundries and sheets-in blue containers

3) Infectious waste-in red containers; Sharps-in cardboard box

4) Pathological waste-in refrigerator (-5°C)

Table 2. Generation rates of hospital waste in selected hospitals

Name of The Hospital	Total amount of clinical waste (Per year)	Number of inpatients (per year) 2015	Number of beds	Average quantity of waste per capita
Republic Clinical Hospital named after Mirgasimov	3060 m ³	14798	459	0.2 m ³
City Children's Clinical Hospital 3	1200	2136	102	0.6 m ³
National Oncology Center	1800	4800	650	0.4 m ³
Education Surgery Clinic of Azerbaijan Medical University	367.2	3500	500	0.1 m ³
The Caspian Sea Navigation Hospital (Kaspar)	2160	1575	150	0.1 m ³

The hospital signed contract with 2 companies - Tamiz Shahar and Caspian Logistics Group for disposing process. They come 2-3 times in a week for taking wastes from the containers. It was also noticed that workers did not wear protective clothing during waste handling activities.

There is a special area for incineration of clinical waste in "Tamiz Shahar" factory. The plant is able to utilize up to 10,000 tons of medical waste a year as temperature of combustion enables to utilize them fully. But, because of some reasons, they do not use this area.

Other wastes are collected by Caspian Logistics Company. They separately collect and cluster this waste from hospitals to incinerator, which is located in Garadagh district in Baku.

This is where all the waste is burnt between 1300– 1400 C, which causes the disappear of the waste and approximately harmless 800 to 1000 grams of ash

is left to the ordinary place in which all the other wastes clustered together.

It can be concluded from the present study that there is poor level of knowledge and awareness about biomedical waste generation hazards; legislation and management among health care personnel in Azerbaijan. A major issue related to current Bio-Medical waste management is lack of knowledge in segregation practices that results in mixing of hospital wastes with general waste making the whole waste stream hazardous.

The main findings and recommendations of the study were:

- It is imperative that waste should be segregated and disposed of in a safe manner to protect the environment as well as human health.
- Incinerators, which do not confirm to the design and emission norms as per rules, must be modified and air pollution control system may be retrofitted to minimize the emission level.
- There is a need for recycling waste, which can be able to recycling.
- Liquid medical waste was being discharged into municipal sewers in hospitals without pre-treatment. There is a need to find proper procedure for handling liquid medical waste.
- Some of storage facilities in the hospitals failed to meet the requirements, there is a need for upgrading facilities in the hospitals.

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Azərbaycanda tibbi tullantıların idarə olunması

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Tibbi tullantılar ətraf mühitə və əhəlinin sağlamlığına risk yarada bilən yoluxucu və təhlükəli təbiətə malikdir. Bu səbəbdən onların idarə olunması böyük əhəmiyyət kəsb edir. Araşdırma tibbi tullantıların idarə olunması təcrübələrini qiymətləndirmək və Bakı şəhərində seçilmiş 5 tibbi müəssisədə yaranan tullantı miqdarını müəyyən etmək məqsədilə həyata keçirilmişdir.

Açar sözlər: Tibbi tullantı, tullantıların idarə olunması, tullantının toplanması, sağlamlıq riskləri, ekoloji risklər

Управление медицинских отходов в Азербайджане

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Медицинские отходы, являются заразной и заразной проблемой которые представляют опасность для окружающей среды и здоровья населения. По этой причине управление имеет большое значение. Исследование осуществляется по мере научных методов для оценки и определения количества отходов в Баку и было выбрано 5 медицинских учреждений по управлению медицинских отходов.

Ключевые слова: Медицинские отходы, управление медицинских отходов, сбор отходов, риски для здоровья, экологические риски.